PATENT ABSTRACTS OF JAPAN

(11)Publication number : 11-207352
(43)Date of publication of application : 03.08.1999

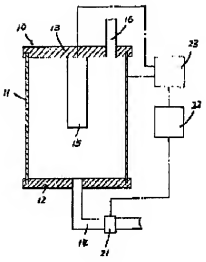
(51)Int.Cl. C02F 1/46
C02F 1/50
C02F 1/50

(21)Application number : 10-008976
(22)Date of filing : 20.01.1998

(71)Applicant : HOSHIZAKI ELECTRIC CO LTD
(72)Inventor : KURODA TAKAO

(54) PRODUCTION OF ANTIBACTERIAL METALLIC IONIC WATER

(57)Abstract:
PROBLEM TO BE SOLVED: To always keep the concentration of metallic ions in antibacterial metallic ionic water such as silver ionic water and copper ionic water produced by electrolysis at a set value, regardless of variation of characteristics of raw water.
SOLUTION: This method is a production method of the antibacterial metallic ionic water by electrolyzing a raw water in an electrolytic cell 10 with a metallic material eluting antibacterial ions as the anode, and relations of water temperature of the raw water fed to the electrolytic bath 10, the flow rate or the electric conductivity to the concentration of metallic ions are preliminarily calculated, and based on the relations of the detected water temperature, flow rate or electric conductivity to the metallic ion concentration, by controlling the voltage and electric current value impressed on both the anode and a cathode of the electrolytic bath 10, the antibacterial metallic ionic water being always constant in metallic ion concentration is produced, regardless of a variation of the temperature, the flow rate or the electric conductivity of the raw water.



CLAIMS

[Claim(s)]
[Claim 1]It is the method of electrolyzing raw water with a cell which uses as the anode metal eluted in an antibacterial metal ion, and generating antibacterial metal ion water, Relation between water temperature of raw water supplied to said cell and ion concentration of said metal ion is computed beforehand, A generation method of antibacterial metal ion water controlling a voltage-current value impressed to the anode and the negative pole of said cell based on relation between water temperature detected and said water temperature-metallic ion concentration.
[Claim 2]It is the method of electrolyzing raw water with a cell which uses as the anode metal eluted in an antibacterial metal ion, and generating antibacterial metal ion water, Relation between a flow of raw water supplied to said cell and ion concentration of said metal ion is computed beforehand, A generation method of antibacterial metal ion water controlling a voltage-current value impressed to the anode and the negative pole of said cell based on relation between a flow detected and said flow-metallic ion concentration.
[Claim 3]It is the method of electrolyzing raw water with a cell which uses as the anode metal eluted in an antibacterial metal ion, and generating antibacterial metal ion water, Relation between electrical conductivity of raw water supplied to said cell and ion concentration of said metal ion is computed beforehand, A generation method of antibacterial metal ion water controlling a voltage-current value impressed to the anode and the negative pole of said cell based on relation between electrical conductivity detected and said electrical conductivity-metallic ion concentration.

DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Field of the Invention]This invention relates to the generation method of the antibacterial metal ion water containing antibacterial metal ions, such as silver ion water and a copper ion.
[0002]
[Description of the Prior Art]Silver ion water, copper-ion water, etc. have a germicidal action, and are used in various kinds of fields as antibacterial metal ion water. In order to generate antibacterial metal ion water, it is general to electrolyze raw water with the cell which uses as the anode the metal eluted in an antibacterial metal ion.
[0003]
[Problem(s) to be Solved by the Invention]By the way, when generating with the electrolytic decomposition process which described antibacterial metal ion water above, metal ion underwater metallic ion concentration is set up based on the voltage-current value impressed to the anode and the negative pole of a cell.
[0004]According to this invention person, in this electrolytic decomposition process, at least one factors, such as water temperature of the raw water supplied to a cell, a flow of the raw water supplied to a cell, and electrical conductivity of the raw water supplied to a cell, carried out learning of affecting metal ion underwater metallic ion concentration.
[0005]Therefore, this invention was made based on this learning, and in the method of generating antibacterial metal ion water with an electrolytic decomposition process, the main purpose has metallic ion concentration in generating the metal ion water which is the always set-up value, without being influenced by the above-mentioned factor.
[0006]
[Means for Solving the Problem]This invention makes an applied object a method of electrolyzing raw water about a generation method of antibacterial metal ion water with a cell which uses as the anode metal especially eluted in an antibacterial metal ion, and generating antibacterial metal ion water.
[0007]In a generation method of antibacterial metal ion water which carried out the deer and the 1st invention of this invention described above, A voltage-current value which computes beforehand water temperature of raw water and a relation of metallic ion concentration which are supplied to said cell, and impresses them to the anode and the negative pole of said cell based on relation between water temperature detected and said water temperature-metallic ion concentration is controlled.
[0008]In a generation method of antibacterial metal ion water which the 2nd invention of this invention described above, A voltage-current value which computes beforehand a flow of raw water and a relation of metallic ion concentration which are supplied to said cell, and impresses them to the anode and the negative pole of said cell based on relation between a flow detected and said flow-metallic ion concentration is controlled.
[0009]In a generation method of antibacterial metal ion water which the 3rd invention of this invention described above, A voltage-current value which computes beforehand a relation of electrical conductivity and metallic ion concentration of raw water supplied to said cell, and impresses it to the anode and the negative pole of said cell based on relation between electrical conductivity detected and said electrical conductivity-metallic ion concentration is controlled.
[0010]

[Function and Effect of the Invention]According to the invention of the 1st of this invention, the water temperature of raw water and the relation of metallic ion concentration which are supplied to a cell are computed beforehand, Since the voltage-current value impressed to the anode and the negative pole of a cell is controlled based on the relation of the water temperature and water temperature-metallic ion concentration detected, even if change arises for the water temperature of raw water in the middle of electrolysis, The voltage-current value impressed to the anode and the negative pole corresponding to change of water temperature can be controlled, and the metal ion underwater metallic ion concentration generated can always be maintained to the set-up value.

[0011]According to the invention of the 2nd of this invention, the flow of raw water and the relation of metallic ion concentration which are supplied to a cell are computed beforehand, Since the voltage-current value impressed to the anode and the negative pole of said cell is controlled based on the relation between the flow detected and said flow-metallic ion concentration, even if change arises to the flow of raw water in the middle of electrolysis, The voltage-current value impressed to the anode and the negative pole corresponding to change of a flow can be controlled, and the metal ion underwater metallic ion concentration generated can always be maintained to the set-up value.

[0012]According to the invention of the 3rd of this invention, the relation of the electrical conductivity and metallic ion concentration of raw water supplied to a cell is computed beforehand, Since the voltage-current value impressed to the anode and the negative pole of a cell is controlled based on the relation of the electrical conductivity and flow-metallic ion concentration which were detected, even if change arises in the electrical conductivity of raw water in the middle of electrolysis, The voltage-current value impressed to the anode and the negative pole corresponding to change of electrical conductivity can be controlled, and the metal ion underwater metallic ion concentration generated can always be maintained to the set-up value.

[0013]

[Embodiment of the Invention](The 1st generation method of this invention) Drawing 1 is an electrolytic device for generating the silver ion water which is the 1st generation method of this invention, and is provided with the cell 10, the water temperature sensor 21, and the voltage-current value setting device 22.

[0014]The cell 10 comprises a tub which pinches the cylinder body 11 fluid-tight and in airtight with the bottom plate 12 and the cover plate 13, the supply line 14 which is connected with the center section of the bottom plate 12, and is open for free passage in a tub, and the anode 15 which it is fixed to the undersurface side of the cover plate 13, and faces in a tub.

[0015]In this cell 10, the cylinder body 11 is formed with electrical conducting materials, such as stainless steel, and the bottom plate 12 and the cover plate 13 are formed at charges of a nonconductive material, such as a synthetic resin, and the anode 15 is formed with silver or a silver alloy. The anode of the power supply 23 is connected to the anode 15, and the negative electrode of the power supply 23 is connected to the cylinder body 11, and the cylinder body 11 constitutes the negative pole of the cell 10.

[0016]In the electrolytic device concerned, the water temperature sensor 21 is infixed in the supply line 14 of the cell 10, and the voltage-current value setting device 22 is connected to the power supply 23. The voltage-current value setting device 22 functions based on the temperature detecting signal from the water temperature sensor 21 that the impressed electromotive force and current to the two electrodes 11 and 15 should be controlled.

[0017]While raw water, such as tap water, is supplied in a specified flow rate through the supply line 14 in the electrolytic device concerned at the generate time of silver ion water into the tub of the cell 10, even impression of the voltage and current of a predetermined value is **** from the power supply 23 to the anode 15 and the negative pole 11 (barrel 11). Thereby, during electrolysis, the silver of the specified quantity flows out of the anode 15 as a silver ion into an electrolysis solution, and silver ion water is generated within a tub. The generated silver ion water is extracted through the excurrent canal way 16 connected with the cover plate 13.

[0018]Drawing 2 is a graph which shows the water temperature of raw water at the time of fixing the supply flow rate and electrical conductivity of the applied current value to the two electrodes 11 and 15, and raw water, and the relation of the silver ion concentration in electrolytic water. The graph shows the silver ion concentration to the water temperature in the applied current value of 5 mA, supply-flow-rate 2 l/min of raw water, and electrical conductivity S/cm of 80micro, and shows that silver ion concentration is falling gradually with the rise of the water temperature of raw water.

[0019]Therefore, whenever it measures beforehand the relation between the water temperature at the time of seting constant silver ion underwater silver ion concentration, and a current value and controls a current value according to this relation and water temperature, the silver ion concentration in producing electrolytic water (silver ion water) is uniformly maintainable. Drawing 3 is a graph which shows the water temperature of raw water at the time of making silver ion concentration fixed to each concentration, and the relation of a current value, and the current value impressed to the two electrodes 11 and 15 with the voltage-current value setting device 22. It controls to the current value calculated from the water temperature of raw water, and the relation of a current value based on the water temperature detection signal from the water temperature sensor 21. Thereby, the silver ion underwater silver ion concentration generated cannot be concerned with change of the water temperature of raw water, but can be maintained to the set-up fixed value.

[0020]Drawing 4 is an electrolytic device for enforcing the 2nd generation method of this invention, and has the same composition as the 1st electrolytic device shown in drawing 1 except for the point that the flow rate sensor 24 is infixed in the supply line 14 which constitutes the cell 10. Therefore, in the electrolytic device concerned, the numerals same about the same members forming as the 1st electrolytic device are attached, and the detailed explanation is omitted.

[0021]In the electrolytic device concerned, the flow rate sensor 24 is infixed in the supply line 14 of the cell 10, and the voltage-current value setting device 22 is connected to the power supply 23. The voltage-current value setting device 22 functions based on the flow rate detection signal from the flow rate sensor 24 that the impressed electromotive force and current to the two electrodes 11 and 15 should be controlled, and to the generate time of silver ion water. While raw water, such as tap water, is supplied in a specified flow rate through the supply line 14 into the tub of the cell 10, even impression of the voltage and current of a predetermined value is **** from the power supply 23 to the anode 15 and the negative pole 11 (barrel 11).

[0022]Thereby, during electrolysis, the silver of the specified quantity flows out of the anode 15 as a silver ion into an electrolysis solution, and silver ion water is generated within a tub. The generated silver ion water is extracted through the excurrent canal way 16 connected with the cover plate 13.

[0023]Drawing 5 is a graph which shows the flow of the raw water at the time of fixing the water temperature and electrical conductivity of the applied current value to the two electrodes 11 and 15, and raw water, and the relation of the silver ion concentration in electrolytic water. The graph shows the silver ion concentration to the applied current value of 30 mA, the water temperature of 10 ** of raw water, and the flow in electrical conductivity S/cm of 90micro, and shows that silver ion concentration is falling gradually with the increase in the flow of raw water.

[0024]Therefore, whenever it measures beforehand the relation between the flow of the raw water at the time of seting constant silver ion underwater silver ion concentration, and a current value and controls a current value according to this relation and flow, the silver ion concentration in producing electrolytic water (silver ion water) is uniformly maintainable.

[0025]Drawing 6 is a graph which shows the flow of raw water at the time of setting silver ion concentration as each concentration, and the relation of a current value, and the current value impressed to the two electrodes 11 and 15 with the voltage-current value setting device 22. It controls to the current value calculated from the flow of raw water, and the relation of a current value based on the flow rate detection signal from the flow rate sensor 24. Thereby, the silver ion underwater silver ion concentration generated is not concerned with the flow rate change of raw water, but is maintained by the set-up fixed value.

[0026]Drawing 7 is an electrolytic device for enforcing the 3rd generation method of this invention, and has the same composition as the 1st electrolytic device shown in drawing 1 except for the point that the electric conductivity sensor 25 is infixed in the supply line 14 which constitutes the cell 10. Therefore, in the electrolytic device concerned, the numerals same about the same members forming as the 1st electrolytic device are attached, and the detailed explanation is omitted.

[0027]In the electrolytic device concerned, the potential conductivity sensor 25 is infixed in the supply line 14 of the cell 10, and the voltage-current value setting device 22 is connected to the power supply 23. The voltage-current value setting device 22 functions based on the flow rate detection signal from the electrical conduction sensor 25 that the impressed electromotive force and current to the two electrodes 11 and 15 should be controlled, and to the generate time of silver ion water. While raw water, such as tap water, is supplied in a specified flow rate through the supply line 14 into the tub of the cell 10, even

impression of the voltage and current of a predetermined value is **** from the power supply 23 to the anode 15 and the negative pole 11 (barrel 11).

[0028]Thereby, during electrolysis, the silver of the specified quantity flows out of the anode 15 as a silver ion into an electrolysis solution, and silver ion water is generated within a tub. The generated silver ion water is extracted through the excurrent canal way 16 connected with the cover plate 13.

[0029]Drawing 8 is a graph which shows the relation between the electrical conductivity of the raw water at the time of fixing the water temperature and flow of the applied current value to two electrodes, and raw water, and the silver ion concentration in electrolytic water. The graph shows the silver ion concentration to the applied current value of 20 mA, the water temperature of 20 ** of raw water, and the electrical conductivity in flow 2 l/min, and shows that silver ion concentration is falling gradually with the rise of the electrical conductivity of raw water.

[0030]Therefore, whenever it measures beforehand the relation between the electrical conductivity of the raw water at the time of seting constant silver ion underwater silver ion concentration, and a current value and controls a current value according to this relation and electrical conductivity, the silver ion concentration in producing electrolytic water (silver ion water) is uniformly maintainable. Drawing 9 is a graph which shows the electrical conductivity of raw water at the time of setting silver ion concentration as each concentration, and the relation of a current value, and the current value impressed to the two electrodes 11 and 15 with the voltage-current value setting device 22. It controls to the current value calculated from the electrical conductivity of raw water, and the relation of a current value based on the flow rate detection signal from the electric conductivity sensor 25. Thereby, the silver ion underwater silver ion concentration generated is not concerned with change of the electrical conductivity of raw water, but is maintained by the set-up fixed value.

[0031]Although the above explanation makes an example the method of generating silver ion water, In order to generate copper-ion water, copper-ion water is generable by the same method as silver ion water by what is necessary's being just to change the anode 15 which constitutes the electrolytic device shown in drawing 1, drawing 4, and drawing 7 into the metallic material eluted in a copper ion, and using this electrolytic device.

[Translation done.]

JAPANESE [JP,11-207352,A]

CLAIMS DETAILED DESCRIPTION TECHNICAL FIELD PRIOR ART EFFECT OF THE INVENTION TECHNICAL PROBLEM MEANS DESCRIPTION OF DRAWINGS DRAWINGS

[Translation done.]

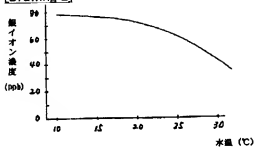
DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]
[Drawing 1]It is an outline lineblock diagram showing the electrolytic device for generating the silver ion water which is the 1st generation method of this invention.
[Drawing 2]It is a graph which shows the relation between silver ion underwater silver ion concentration and the water temperature of raw water.
[Drawing 3]It is a graph which shows the relation of the water temperature of raw water and current value in the silver ion water of various kinds of silver ion concentration.
[Drawing 4]It is an outline lineblock diagram showing the electrolytic device for generating the silver ion water which is the 2nd generation method of this invention.
[Drawing 5]It is a graph which shows the relation between silver ion underwater silver ion concentration and the flow of raw water.
[Drawing 6]It is a graph which shows the relation of the flow of raw water and current value in the silver ion water of various kinds of silver ion concentration.
[Drawing 7]It is an outline lineblock diagram showing the electrolytic device for generating the silver ion water which is the 3rd generation method of this invention.
[Drawing 8]It is a graph which shows the relation between silver ion underwater silver ion concentration and the electrical conductivity of raw water.
[Drawing 9]It is a graph which shows the relation of the electrical conductivity of raw water and current value in the silver ion water of various kinds of silver ion concentration.
[Description of Notations]
10 [— A cover plate, 14 / — A supply line, 15 / — The anode, 16 / — An excurrent canal way, 21 / — A water temperature sensor, 22 / — A voltage-current value setting device, 23 / — A power supply, 24 / — A flow rate sensor, 25 / — Electric conductivity sensor.] — A cell, 11 — A cylinder body (negative pole), 12 — A bottom plate, 13

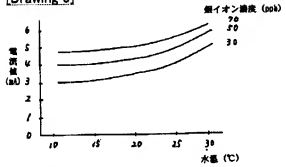
[Translation done.]

DRAWINGS

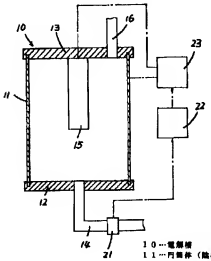
[Drawing 2]



[Drawing 3]

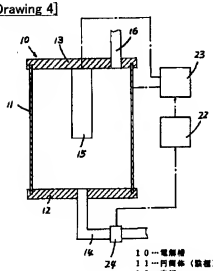


[Drawing 1]



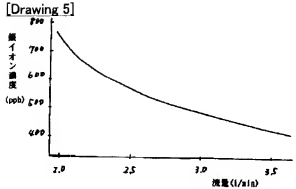
10…電解槽
11…円筒体（陰極）
12…底板
13…蓋板
14…供給管路
15…陽極
16…排出管路
21…水量センサ
22…電圧・電流値設定装置
23…整流

[Drawing 4]

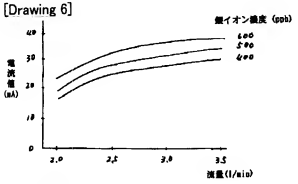


10…電解槽
11…円筒体（陰極）
12…底板
13…蓋板
14…供給管路
15…陽極
16…排出管路
22…電圧・電流値設定装置
23…整流
24…流量センサ

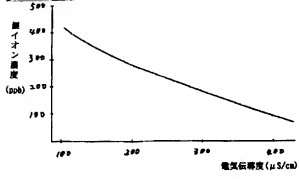
[Drawing 5]



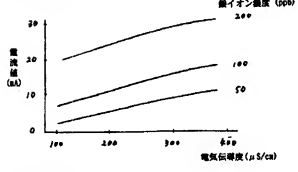
[Drawing 6]



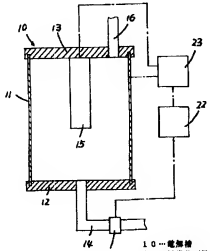
[Drawing 8]



[Drawing 9]



[Drawing 7]



10…電解槽
11…円筒体（陰極）
12…底板
13…蓋板
14…供給管路
15…陽極
16…抽出管路
22…電圧・電流値測定装置
23…電源
25…電気伝導度センサ

[Translation done.]